LANDSCAPE HISTORY OF THE GYULA — VĂRŞAND REGION

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Introduction

Vegetation history assessment is gaining an increasingly important role in conservation efforts and researches, since it is essential to have knowledge about the environment, the landscape and its patterns and the processes and events that shaped the vegetation. Thus, landscape history assessment has become an important step in landscape wide researches. In the past two decades a growing number of papers were published on the subject (e.g. Molnár and Biró 1997, Biró and Tóth 1998, Rédei *et al.* 1998, Szirmai 2008, Molnár *et al.* 2008). The application of historical maps in the examination of landscape pattern changes has also become widely used and accepted (Biró 2006). Because of the accessibility of written sources and maps, these surveys can usually cover back till the 18th century. These researches can reveal the past usages of the landscape, the course of its development, and the extent and direction of its alteration and also the reason behind these. The resulting data can be further used in a wide range of applications, such as research, landscape planning and landscape assessment (Pickett 1991).

It is well known that the landscape of Hungary underwent a major transformation in the course of the past centuries. This transformation was influenced by both human presence and natural factors. Human land utilization has significantly altered the landscape of the Great Hungarian Plain. Throughout the centuries its inhabitants have utilized the fertile lands in various ways and with varying intensity. Canalizations and drainages have also brought further changes. To understand how and why a certain region have evolved to its present state it is therefore very important to familiarize oneself with its past. Our goal was to reveal the past of the alkaline steppes around the Gyula and Gyulavarsánd region. As a result we were able to learn the traditional ways of land utilization in the region, further assisting in the conservation of their natural values.

Material and methods

The following ten maps from different eras were used for the landscape history assessment: I Military Survey (1783); Plan des Markflecks Gyula (1784); Mappa Exhibens Situationem Dominii Gyulensis in Comitatibus Bekesiensi, Csongradiensi et Aradiensi existens et ad… (1788) (created by András Paulovits);

The Harruckern lordship's (Békés county, Csongrád county, Csanád county, Arad county) map (late 18th century); II Military Survey (1863); III Military Survey (1872-1884); Békés county (1881) (created by József Mihálfi); Public administration map of Arad county (late 19th century) (created by Ignácz Hatsek); Békés-Csaba (1910); Békés-Csaba (1911).

In addition, we have used a number of historical documents that held relevant data about land usage and vegetation (Kitaibel 1798 in Gombocz 1945, Ecsedy 1832, Komáromy 1834, Mogyoróssy 1858, Haán 1870, Gallacz 1896, Karácsonyi 1896, Hubai 1934, Scherer 1938, Dányi, Dávid 1960, Oláh 1975, Becsei 1979, Erdmann 1989, Dóka 1997, Dóka 2006, Szabó 2008), and also interviews with the locals.

In the era of the Hungarian Kingdom, the area in focus belonged to the counties of Békés and Arad. It is important to note, that after the peace treaty of Trianon in 1920, the region that belonged to Arad county was annexed to Romania. We therefore have much less data about changes regarding the 20th century.

Results

Before and during the Turkish Occupation (till the end of 17th century)

In its natural state the landscape of the Great Hungarian Plain consisted mainly of winding rivers and marshlands spanning large areas. The shape and location of the river beds were changing frequently. In lower areas close to the river, marshlands and pastures were the main food sources for the inhabitants. During larger floods the higher plains were fertilized by the silt left by the river. These provided excellent lands for agriculture. Due to the natural richness of resources, there has been a steady population in the vicinity of the three Körös Rivers since the Upper Palaeolithic era. However, the effects of human impact have only become noticeable since the last 500 years. There are countless ways humans utilized the land around them. The rivers provided sites for fishing while temporal wetlands were used for extensive grazing. Aside from providing game and lumber, forests also offered shelter in times of war. The rich wildlife of marshes was also exploited as a food resource by the local inhabitants (Dóka 1997). Higher plains that were not prone to flooding were essential, since they provided safe zones for the inhabitants to build permanent settlements (Scherer 1938) and for arable lands (Dóka 1997). In this area, active cultivation of crops only begun in the late 14th century (Karácsonyi 1896). It is important to note that the alkaline grasslands surrounding Gyula are considered "primary alkaline grasslands", meaning that they have formed naturally, before the beginning of the river canalizations. The water regime of these grasslands remained unchanged in the last 150 years, and their vegetation remained rich and characteristic. It is also

presumed that the grasslands were inhabited by native ungulates (Vera 2000, Molnár and Borhidi 2003), this could mean that the grasslands in the Gyula region were natural pastures long before the effects of human animal husbandry.

In the 15th and 16th century, the majority of Békés county's population lived from animal husbandry. Animals that were bred included horses, cattle, lamb and pork. Beekeeping was also practiced in areas near forests (Karácsonyi 1896). Grazing can be dated back to these centuries on wetlands south of the present location of Gyula (Scherer 1938). Wheat, barley, oat and millet were cultivated on the plough lands, while peas and cabbage were grown in the gardens. Also, Gyula was the only region to grow grapes in the whole county (Karácsonyi 1896). According to historical sources mentioning a large number of forests near Gyulavári and Varsány, the area must have been more forested than it is at present (Scherer 1938). These forests were somewhat farther, in territories which were not included in our study area.

The beginning of the Turkish Occupation brought a drastic change in the life of the locals. Gyula fell under Turkish control in 1566, and was not liberated until 1695. In the Turkish Empire the conquered land and its populace was the property of the sultan. The sultan then granted portions of these lands to civil servants and soldiers. However these lands were granted by the sultan for an unspecified time period and could be revoked at will. This system resulted in careless land use, and frequent pillaging (Anon. 1999). The following dubious time period made the population even more reliant on animal husbandry, than before (Karácsonyi 1896). The most important economical sector of the occupied territories was the agricultural sector. However, in contrast with today's practise, the land was used for animal husbandry, and not for ploughing (Anon. 1999). The locals most commonly bred cattle. The horse keeping and the number of horses kept, was falling. Wheat, barley, oat and millet remained the most common crops cultivated on plough lands. Besides cabbage, gardens adopted carrots, parsley, onions and garlic (Karácsonyi 1896).

Only a small portion of the population was able to flee from territories occupied by the Turkish Empire. These included the population of cities, and nobles. The majority of the locals consisted of the serfdom who had no way of relocating. In the period before the Turkish Occupation, the Plain was characterized by an extensive network of villages. However, as a result of the war most of the smaller villages were destroyed and the remaining population moved to larger settlements. Throughout the one and a half centuries of the Turkish Occupation, the local population decreased or remained stagnant, thus the Plain was very scarcely populated. The population density was far below those of Western Europe. The increase of the population was hindered by wars, and the following pillaging and epidemics (Anon. 1999). Furthermore, the liberating troops and wars caused more damage to the region than the Turkish occupation beforehand. This further induced the expansion of marshlands into the ruined

landscape (Dóka 2006). Agriculture on these long abandoned lands had to be re-established (Karácsonyi 1896). In the first period after the restoration of Gyula, animal husbandry remained the main form of job, plant cultivation was virtually nonexistent (Scherer 1938). This can partly be explained by the fact that notable population growth only begun after the ending of Rákóczi's War for Independence in 1711. Afterwards more and more land was drawn into agricultural use. Also, due to spontaneous and organized immigrations, a number of Slovakians, Romanians and Germans also settled in the area (Dóka 2006).

The 18th century

Animal husbandry was the most important sector, until the 18th century. It was practised mostly extensively (Erdmann 1989), meaning that the animals were out in the fields all year, and went after their food themselves. This is also pointed out by the fact, that at the end of the 18th century, most of the agriculturally usable territories were meadows and pastures (Dányi and Dávid 1960). Grazing and mowing was most common in the lower plains that were the most prone to flooding (Erdmann 1989, Dóka 2006). Belts were formed in the border around the settlements: the inner pastures and the plough land closer to the border and the outer pastures, most commonly farther away on the "leased fields". The cattle, horses, sheep and pigs lived mostly in the outer meadow. Wells were drilled on fields that were poor in water (Erdmann 1989), therefore wells on maps indicate pastures. "Leased fields" had an important role in the economy, not only as pastures, but also as meadows and plough lands. In some places, vineyards were established on "leased fields". In Békés county, it was common that these fields were not leased to the villagers, but to cattle traders, who bought cheap animals in Transylvania, feed them up on the rich fields, and then sold them in sales (Dóka 2006).

However, as a result of the population growth during the century and the increase in grain demand, and also because of the frequent floods on the riverside, more and more pastures were ploughed in. The shrinkage of land available for grazing resulted in the advancement of forage production and the extensive animal keeping was replaced by the semi-extensive animal keeping, which required a smaller territory for the animals. This meant that the animals roamed the pastures from spring to autumn, but spent the winter in their barn. Meadow management spread to produce food for the animals during winters, however, the meadows were not properly attended to, and the technology of the haymaking was undeveloped (Erdmann 1989).

In the 1700s the lands near the outskirts of Gyula were pastures, meadows and reed beds, while the plough lands were located farther away (Scherer 1938). Between the 1700s and 1760s depleted fields were used as fallows or meadows, and crops were moved to the next suitable location. However as of 1760 plough

lands moved on to occupy the entire flood safe region, and with no more available land their expansion came to a halt. Lacking available land, the reed beds were cleared and were replaced by meadows and pastures (Scherer 1938). The arable lands were mainly used to grow wheat, barley, oats, millet and corn, while hemp, cabbage, tobacco, carrots, peas and lentils were grown in the gardens (Dóka 2006). At the end of the 18th century, a growing number of farmhouses were built, but back then the farmhouse was solely used for the purpose of wintering and watering the animals (Hubai 1934).

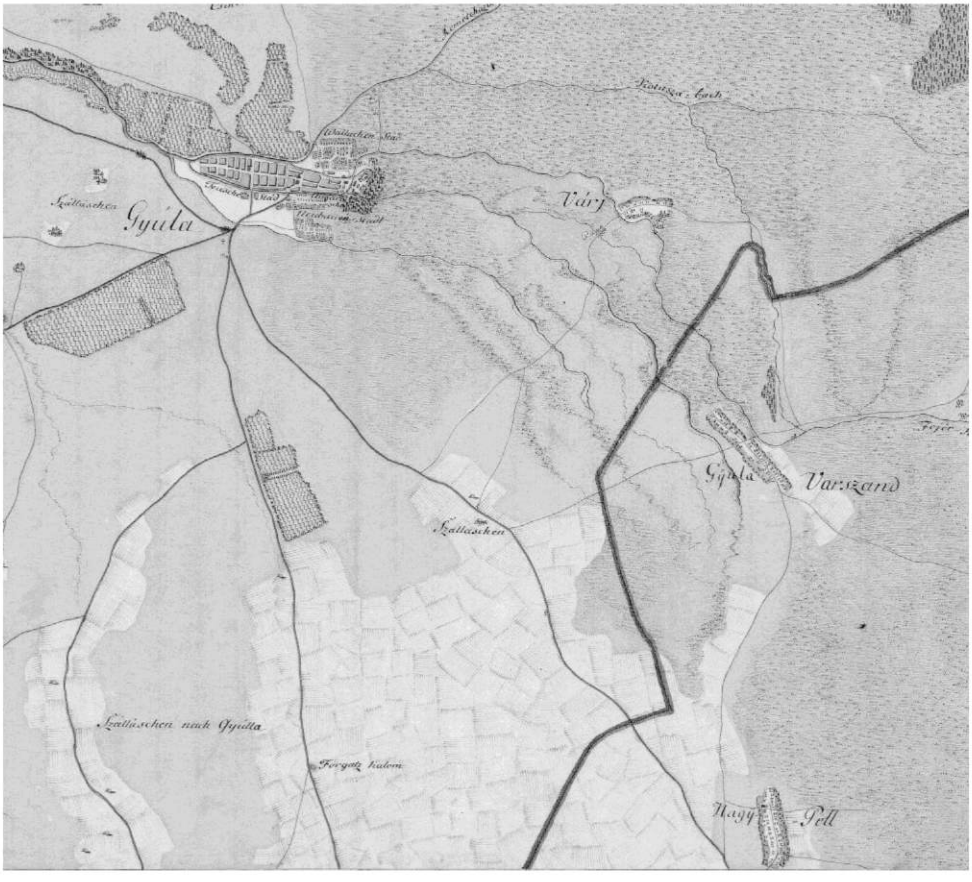

Figure 1. The structure of the landscape of Gyula region at the map of the First Military Survey (1783)

The earliest map made at the time to depict the land use is the I Military Survey (1783; Fig. 1). The traces of grazing are clearly visible as "accomodations" ("Szálláschen") are noted next to the fields examined. These buildings were used for the watering and wintering of the animals (Ecsedy 1832).

The map shows marshes near Gyulavarsánd, and there is an extensive marshland east of the region of interest. The I Military Survey's (1783) description of the country also confirms, that the grasslands near Gyula are moist (saturated with water). The extensive marshlands provided a rich environment for a large number of bird species (storks, wild geese, herons, wild ducks), and also to mosquitoes (Scherer 1938). The map shows arable fields on the studied area, south-west of Gyulavarsánd.

Figure 2. The region of Gyula (Békés county) at the map of András Paulovics (1788)

This however is contradicted by a number of other historical sources we have found. The outline of today's grassland can be clearly delineated on the map of

András Paulovits (1788; Fig. 2) that was made five years later. This shows evidence that the area was not ploughed in. This is further evidenced by Kitaibel (in Gombocz 1945). Alkaline grasslands and pastures are mentioned in his description from 1798. Furthermore, according to Scherer's (1938) description, the first arable lands near the city only appeared after the period of the flood control. It is also clearly visible on a late 18th century map of the Harruckern estate, that the region was not cultivated. Therefore it can be stated, that the information stored in the I Military Survey, is not accurate in this regard.

Turn of the century and the 19th century

In the late 18th and early 19th century, the continued population growth resulted in further drainage of marshes and the control of the Körös Rivers (Dóka 1997). Evidence of river control in the Körös region can be found in the 1740s, but these remained strongly limited until the 1770s (Gallacz 1896). Flood control works were also conducted on the south-east regions near Gyula, at the end of the 18th century, making more room for arable land (Scherer 1938). Imre Vida – the official responsible for the agriculture in the region – played a major role in the development of the region. In an effort to upgrade the Gyula lordship, he ordered the construction of channels to support watermills around the city, and widened a number of channels to open new trade routes and possibilities for transportation. He was also committed to the drainage of lands belonging to the lordship. In the 1800s a number of banks were erected that primarily served to protect the nearby roads from the floods (Dóka 1997).

A series of major economic changes took place on the turn of the 19th century. As a result of the emerging wars of the era, there was an increase in grain demand and export. The price of grain and other cereals started to rise. Methods for lamb breeding and keeping were also advancing, since the demand for wool also has risen. Cattle and horse breeders have also found a stable market. As a result, a large scale advancement of agriculture was observable. The breaking up of pastures, to be used for arable fields, and the use of fertilizer also became common. Gaining new land by clearing forests also became a practice in the era. Newer, more advanced tools and methods were developed and used in agriculture. New kinds of ploughs were used in ploughing, and harvesting of crops was done with scythes instead of sickles. Treading grain with horses was made obsolete by the discovery of the flail (Dóka 2006).

With the end of the Napoleonic wars, the times of prosperity had ended, and a period of economical recession began. At the end of the 1810s the price of grain began to fall bringing hard times for the Hungarian economy. This was somewhat mitigated by a brief uplift in the English textile industry, that resulted in growing demands for wool. To some extent the rising wool prices offered compensation for the profit lost on grain, but this brief uplift only lasted until 1825. However as

the recession unfolded, the economy began to adapt to the new circumstances. From around the end of the 1820s goods produced by the peasantry had a growing demand. This was induced by the local traders, and the presence of large settlements. As distilleries and sugar production were constructed on the estates, the demand for beet and potato also rose. Finally corn and tobacco fields also began to gain larger ground (Dóka 2006).

The 19th century was the era of massive river and flood control efforts. While work on the Fehér Körös was finished in Arad County by 1855, the bed of the Fehér Körös was still intact in Békés county. Thus water rushing down from the higher regions is known to have caused damage there (Dóka 1997). After the 1855 flood in Gyula, it became necessary to regularize the bed of the river (Mogyoróssy 1858, Dóka 1997). Work was finished in the next couple of years. In the following 1860s the weather was dry and droughty, which switched the locals interests from flood control, to external water supplementation, however this did not last too long. With the end of the droughty period, in the 1870s work on flood control efforts renewed. A new need of draining inland waters arose, and as a solution, new canals were established. The control of Körös Rivers efforts were finished by 1879, and the succeeding efforts were concentrated on inland water drainage and fortification of the bank system (Dóka 1997). As a result, the marsh and lake coverage was shrinking – some entirely gone – but the region around Gyula generally remained saturated with moisture (Komáromy 1834, Haán 1870), this is also evidenced by a number of maps from the 19th and the 20th century.

Major changes in land usage were in progress in the wake of the river control efforts. Production on arable lands was increasing and their establishment on new lands weighted more heavily. Furthermore, in contrast to the 1860s tendencies in other parts of the country, the portion of land used as pastures and meadows was not growing in Békés county. New territories that were gained from draining were plowed whenever it was feasible. These new lands were primarily used for grain production (Dóka 1997). Cultivated plants included wheat, barley, oat, maize and millet (Ecsedy 1832). These changing land usage tendencies were also reflected in the livestock industry. Pigs were the first to be excluded from pastures, but as overall pasture coverage shrunk, soon sheep farming was also facing a recession (Dóka 1997). Slowly, the herds of cattle disappeared and most cattle were kept in barns (Scherer 1938). As stabling was gaining more ground, there was an increasing demand on feed, which somewhat balanced the grain centred land use of the time (Dóka 1997). The lower alkaline regions were used for harvesting hay, these has a small but quality yield (Mogyoróssy 1858). Although the share of livestock was dwindling in the century (Mogyoróssy 1858, Scherer 1938), livestock production had a dominating role up until 1850 (Hubai 1934). From the second half of the century, grazing was mostly practiced in lordships. This can be explained by the changes in society, induced by the emancipation of the serfdom.

With the cessation of the so called "robot" – the usual serf had to spend a portion of the week labouring on his lord's fields –, there was no manpower to cultivate the lands, and modern infrastructure to help a smaller labour base was nonexistent. However, these problems had only a minimal effect on the undemanding extensive livestock farming (Oláh 1975). The 19th century's changes in livestock farming (extensive was abandoned for stabling livestock farming) have also brought forward a change in the used breeds of animals. It was not possible to exploit the expensive, high quality feed with undemanding, hardened animals that were used to grazing. Cross breeding was usually carried out in the lordships, with the peasantry getting hold of the animals breed there (Dóka 2006).

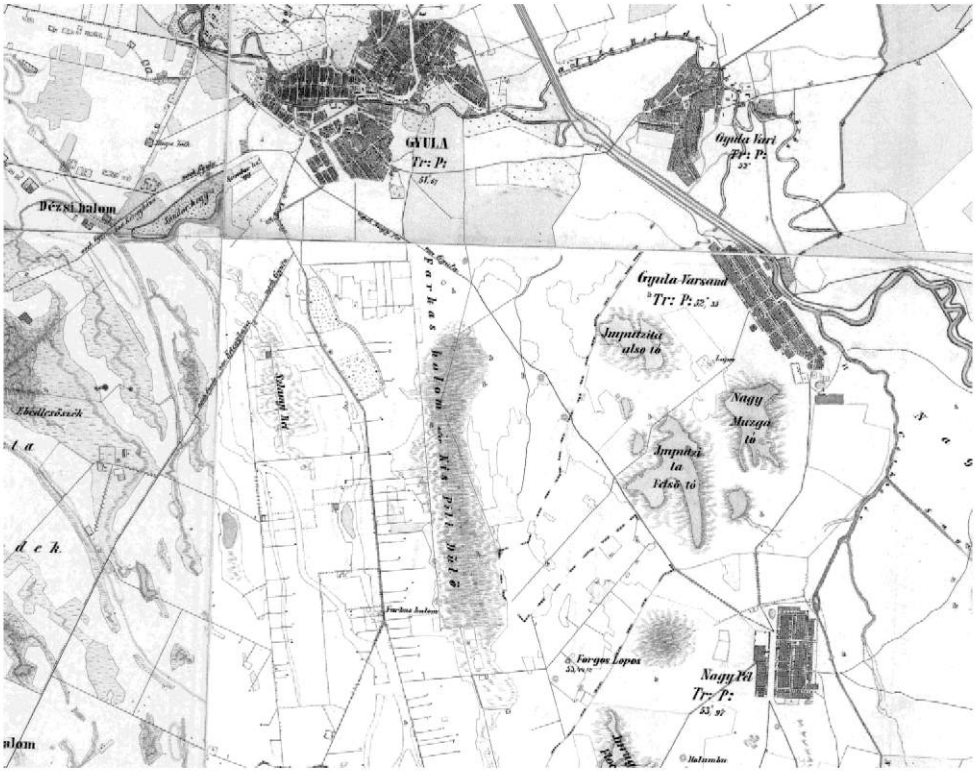

Figure 3. By the time of the Second Military Survey (1863) the region of Gyula has been transformed considerably.

Every village in Békés county was doing some kind of gardening. It could not escape the phylloxera disaster, which destroyed the grape cultures, but the region was repopulated by 1895 (Dóka 2006). Aside from the wineries, there were also a number of orchards. Most of the fruits produced were apples, pears, sour

cherries, and plums, with also smaller plantations of apricots, peaches and almonds (Mogyoróssy 1858). A growing number of farmhouses were appearing in the countryside (Mogyoróssy 1858), but they were not used as residential. This was further evidenced by a prohibition that did not permit families to move in around the time of 1822 (Scherer 1938). The clusters of farmhouses were scattered through the landscape (Mogyoróssy 1858).

While the landscape stayed mostly moist and marshy, according to the map of the II Military Survey (1863; Fig. 3) drainage canals appeared. It is important to note that the location of lakes and watery grasslands mostly matches today's semi natural, ploughing free areas. (For example, in place of the lake on the western side of the road, going towards Elek and Ottlaka, today alkaline grasslands, *Artemisia* salt steppes, degraded loess steppes and alkaline marshes can be found.) A number of lakes can be seen south-east of Gyulavarsánd, the larger ones are referred to by their names, in the map. The area of the Nagy Muzga Lake is mostly covered by alkaline grasslands nowadays. The Imputzita Felső Lake is now replaced by alkaline grasslands and *Artemisia* salt steppes mosaics. The Imputzita Alsó Lake is now covered by alkaline marshes, alkaline grasslands and *Artemisia* salt steppes. On the Hungarian side, south of Gyula, the outline of our region of study is a clearly visible marshy area called Farkashalom or Kis Pili dűlő. Shadoofs (wells) around the grassland indicate grazing land use, similarly to the areas around Gyulavarsánd. Farmhouses began to appear along the road going to Ottlaka and Elek. These were used as residential buildings after the 1850s (Hubai 1934). The fields near the road going from Gyulavarsánd to the south-west were already used as plough lands, and there were wooden and tone buildings on the fields.

While the III Military Survey only began 10 years later, it shows evidence of major changes in the landscape (Fig. 4). The number of canals increased, and the whole region became much dryer than before. The extent of the arable fields also increased with the land gained from the drainage. The number of farmhouses was also increasing, and there were dirt roads leading to the buildings. The houses were surrounded with plough lands. The Kispéli grassland remained a largely moist region, and beside the wells, there is specific notation, showing that the land was used for grazing. The previously mentioned lake on the western side of the road leading to Ottlaka and Elek became a pasture. The drainage is most visible on the Gyulavarsánd region. The Alsó and Felső Lakes are still shown, but are much smaller, and the Felső Lake is separated into two. The Nagy Muzga Lake was drained completely and is used as a meadow, crossed by the Élővíz channel. Many of the smaller lakes also disappeared; the remaining ones are surrounded by wells and reed beds. Wetlands around the lakes coincide with the present day semi natural grasslands. East of these regions there were dryer meadows that have been turned to plough lands. A portion of these plough lands were vineyards (Pili vineyards).

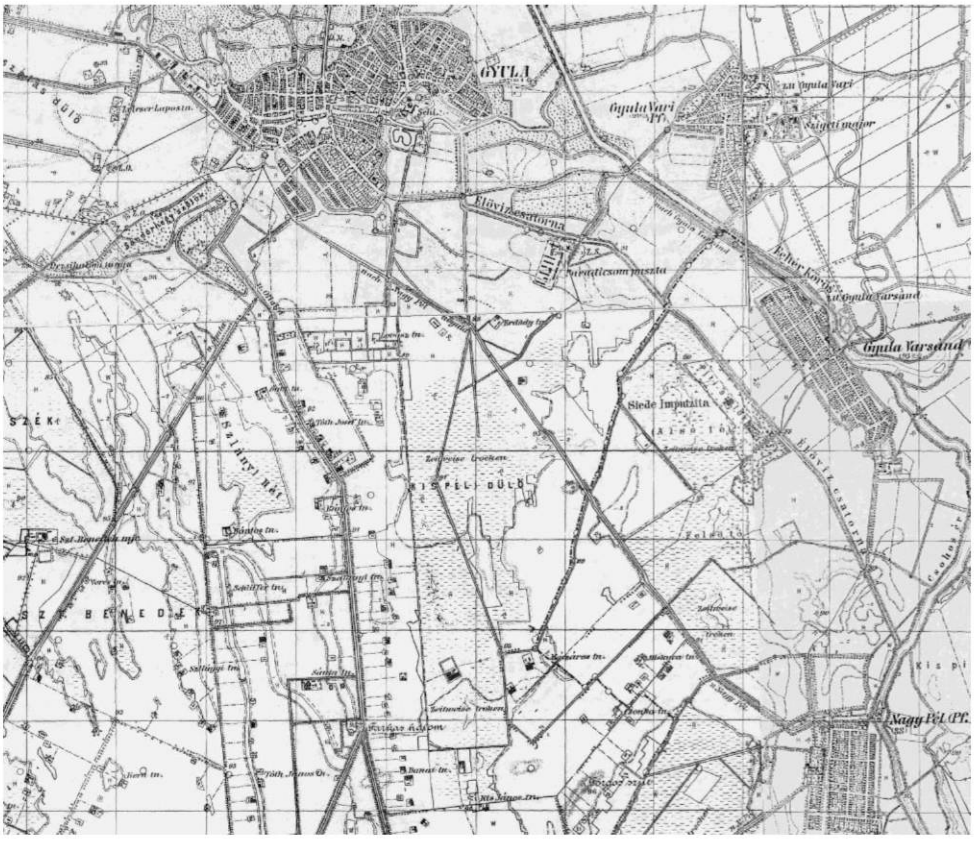

Figure 4. The map of the Third Military Survey (1872-1884) shows further changes.

Turn of the century and the 20th century

On the turn of the 19th and 20th century, the most important sector of livestock farming was cattle breeding. However, with the growing corn production, the number of pigs kept was also rising. Keeping horses was also popular, since it helped in labour-intensive agricultural tasks. While sheep farming was losing ground everywhere, there was still a large sheep population around Gyulavarsánd (Dóka 2006). However, in the course of the 20th century, the livestock farming undergone a series of major changes. According to Scherer (1938) "cattle farming had begun its endgame" in the early 20th century. Other sources (Kollega 1996-2000) indicate that until the 1960s, the major sector was cattle farming, and only then was it replaced by pig farming. The conclusion is that it was in the 20th century, that pig farming became the leading sector of the livestock industry. Poultry farming was undergoing rapid development, while sheep farming was dwindling away, and horse keeping was made mostly obsolete by modern

agricultural equipment. The regression of lands used for fallow also had a great significance (Kollega 1996-2000).

Cereals took the leading role in cultivation. The most important product was grain. Coverage of barley and oats was decreasing in favour of corn. As a result of the developing vegetable oil industry, the total yield of sunflower fields was also increasing. Lastly, tobacco also had some significant share. To increase the yield of the fields, a number of different agro-technological procedures were also spreading, such as automation with modern machinery, soil fertilization, irrigation and pest management (Kollega 1996-2000). All these contributed to the growing environmental stress on the landscape.

Beginning from the early 20th century, a growing number of farmhouses was observable in the landscape. Aside from their residential functions, these farm clusters also served as economical centres (Hubai 1934). The Plain's system of farms remained a characteristic part of its network of settlements between the two world wars. It was not until the 1945s that its population started to decrease (Beesei 1979) and by the 1990s its population, extent and density decreased considerably. This is partly due to the events taking place between the 1940s and 1950s, when there was an effort to organize the locals in to the newly established farm villages. However, the main reason behind the sudden population decrease was the establishment of the farmers' co-operatives that led to the widespread abandonment of the farms, and the shrinkage of these settlements (Kollega 1996-2000). Moreover, the forced industrial concentration, and the collectivisations in the agricultural sector further reduced the population in agriculture-based regions – like Békés County – and contributed to abandonment of farms and smaller villages (Kollega 1996-2000).

The development of the present state

After 1920, the Hungarian – Romanian border separated the regions around Gyula and Gyulavarsánd. Thus the two regions developed differently and were subject to different influences. Gyula remained on the Hungarian side, and after the change of regime (1990), grazing ceased suddenly in its vicinity (J. Schön, personal communication). Until then, grazing was performed with cattle and sheep. Since the change-over, only small portions of land are grazed with some cattle, or sheep. Mowing is abandoned on a portion of the meadows, because there is no need for feed anymore (J. Steigervald, personal communication). In contrast, on the Romanian side, near Gyulavarsánd the entire grassland is grazed with cattle and sheep. Both sizes show extensive ploughing, however more grasslands have escaped this fate on the Romanian side. The semi-natural grasslands are grazed in Romania and mowed in Hungary. Only a handful of patches remain grazed near the farms (Erdős *et al.* 2011b). The conclusion is that land use on the two sides differs notably. The grassland on the Hungarian side is undergrazed,

while the Romanian side is overgrazed, and this is reflected by the vegetation of the grasslands on both sides (Erdős *et al.* 2011a).

Discussion

Since data on land-use history can hold important information for conservation efforts. In this study, our aim was to reveal the land-use history of alkaline grasslands between the settlements of Gyula and Gyulavarsánd.

The alkaline grasslands around Gyula are primary that means they did not form as a result of the flood control efforts in the region, but they have been alkaline for centuries before (Molnár and Borhidi 2003). This was confirmed by Kitaibel (in Gombocz 1945) who reported saline vegetation in the area in 1798, although flood control in the region did not begin until 1770s, moreover the operations in the late 18th century could only have effected a small portion of the area in focus (Dóka 1997). It is presumed that these grasslands were inhabited by native herbivores before human land use (Vera 2000, Molnár and Borhidi 2003) later, in the Middle Ages they were used as pastures according to Scherer (1938), and from the 1770s grazing is clearly indicated by most of the available maps.

Grazing has continued up until the present day, however it had shown a steady decline (Hubai 1934, Scherer 1938, Szabó 2008). As a result of the drainages and the river controls the agriculturally usable area has greatly increased. This has induced a major shift in the proportion of the branches of cultivation. The area of the arable fields has increased while the extent of the pastures has decreased, therefore the extensive methods of the animal husbandry declined gradually (Kollega 1996-2000, Dóka 1997). By the end of the 20th century, grazing has almost completely disappeared in Hungary. There are no significant livestock in the area at present (Erdős *et al.* 2011a). One of the reasons is that the present day economic status does not make animal farming profitable. Following the treaty of Trianon in 1920, the Gyulavarsánd region belongs to Romaina, and was exposed to different economical and societal trends. The most important difference, is that grazing has continued in these territories ever since (Erdős *et al.* 2011a).

The alkaline grasslands in the region were not broken up. Although the map of the I Military Survey marks these meadows as arable fields, this is proven to be inaccurate, as a number of other maps from the 18th century and the notes of Kitaibel (in Gombocz 1945) contradict these claims. Thus, we conclude that the maps of the I Military Survey must be treated with caution.

The emergence of the world of small farms began in the late 18th century, and ended in the early 20th century. At the beginning, the farmhouses were only used for the watering and wintering of the animals (Ecsedy 1832, Hubai 1934, Scherer 1938), and for the storage of the harvested forage (Ecsedy 1832). From the second half of the 19th century, the building also became residential, and by the early 20th

century, they have come to fill the role of economical centres (Hubai 1934). The expansion of the farm system in the second half of the 19th century was strongly related to the large-scale land shaping operations (flood control, marsh drainage) and the advent of intensive farming (Kollega 1996-2000). Population on the farm world started to dwindle in the 1945s (Becsei 1979), and by the 1990s, both its extent and population have diminished significantly. The main reason behind this was the collectivization of agriculture, and the transition to large scale production (Kollega 1996-2000).

While the region of interest remains soggy and marshy until the present day, it was more so in the 19th century, and back in the 18th century, large marshes and a system of smaller and larger lakes dominated the landscape. The conclusion is that the flood control works, beginning in the late 18th century, have caused the significant desiccation in the examined grasslands. Smaller lakes have completely disappeared, and the larger ones have shrunken extensively. By the early 20th century these remaining lakes are seen to be tiny, and most of them are gone by today. Semi-natural vegetation can still be found on regions, where these once soggy fields escaped being broken up.

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Maps

I Military Survey (1783)
Plan des Markflecks Gyula (1784)
Mappa Exhibens Situationem Dominii Gyulensis in Comitatibus Bekesiensi, Csongradiensi et Aradiensi existens et ad... (1788) (created by András Paulovits) BéML XV.1.a.48.
The Harruckern lordship's (Békés county, Csongrád county, Csanád county, Arad county) map (late 18th century) BéML XV.1.a.47.
II Military Survey (1863)
III Military Survey (1872-1884)
Békés county (1881) (created by József Mihálfi) BéML XV.1.a.300.
Public administration map of Arad county (late 19th century) (created by Ignácz Hatsek) BéML XV.1.a.1.
Békés-Csaba (1910) BéML XV.1.d.9.
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